

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. *(Currently amended)* A process for detecting the phenomenon of fluorescence in a microscope, comprising the steps of:

irradiating a sample by at least one of a modulated and a pulsed laser light source so as to produce fluorescence, and

detecting the fluorescence with a detector having variable phase positions, at least in two different phase positions of the detector, using a detector with a modulatable amplification.

2. *(Previously amended)* The process, as claimed in claim 1, further comprising the step of generating an image for each phase position using a signal output by the detector.

3. *(Previously amended)* The process, as claimed in claim 2, further comprising the step of displaying the image generated for each phase position on a monitor.

4. *(Previously amended)* The process, as claimed in claim 1, wherein said steps of irradiating and detecting are carried out using a laser scanning microscope.

5. *(Previously amended)* The process, as claimed in claim 1, wherein said detecting step is carried out using a modulatable PMT as the detector.

6. *(Previously amended)* A process for detecting the phenomenon of fluorescence in a microscope, comprising the steps of:

 irradiating a sample using at least one of a modulated and a pulsed laser light source so as to produce fluorescence,

 multiplying a reference signal, corresponding to the at least one of the modulated and pulsed laser, and a measurement signal, corresponding to a modulated detection of the fluorescence, together with a fixed variable phase relation to obtain a result; and

 using the result to display an image.

7. *(Previously amended)* The process, as claimed in claim 6, wherein the phase relation between the reference signal and the measurement signal is adjusted in such a manner that the phase shift is zero.

8. *(Previously amended)* The process, as claimed in claim 6, wherein said detecting step is carried out using non-descanned detection.

9. *(Previously amended)* The process, as claimed in claim 1, wherein said irradiating step is carried out using multiphoton excitation of fluorescence emission.
10. *(Previously amended)* The process, as claimed in claim 1, wherein said irradiating step is carried out using a cw laser, modulated by means of an acousto-optical modulator (AOM).
11. *(Previously amended)* The process, as claimed in claim 1, wherein said irradiating step is carried out using a cw laser, modulated by means of a Pockel cell.
12. *(Previously amended)* The process, as claimed in claim 1, wherein said irradiating step is carried out using a pulse laser, which is additionally modulated.
13. *(Previously amended)* The process, as claimed in claim 1, wherein said irradiating step is carried out using a pulse laser, which is additionally modulated by means of an acousto-optical modulator.
14. *(Previously amended)* The process, as claimed in claim 1, wherein said irradiating step is carried out using a pulse laser, which is additionally modulated by means of a Pockel cell.

15. *(Previously amended)* The process, as claimed in claim 1, wherein said detecting step is carried out using time resolution and wherein said irradiating step is carried out using a multiphoton process.

16. (Previously amended) The process, as claimed in claim 1, wherein said irradiating step is carried out using a pulsed near infrared laser.

17. (Previously amended) The process, as claimed in claim 1, wherein said irradiating step is carried out using a pulsed near infrared laser, and further comprising the step of:

converting the frequency of the laser downstream to 1 photon excitation.

18. (Previously amended) The process, as claimed in claim 1, wherein said irradiating step is carried out using a pulsed near infrared laser, and further comprising the step of:

converting the frequency of the laser downstream to 1 photon excitation of fluorescence.

19. (Previously amended) The process, as claimed in claim 1, wherein said detecting step is carried out using phase sensitive detection for improving the signal to noise ratio.

20. (Previously added) The process, as claimed in claim 2, further comprising the step of carrying out a mathematical algorithm on the image to produce another image.

21. *(Previously added)* The process, as claimed in claim 7, wherein said detecting step is carried out using non-descanned detection.
22. *(Previously added)* The process, as claimed in claim 1, wherein said irradiating step is carried out using two photon excitation.
23. *(Previously added)* The process, as claimed in claim 6, wherein said irradiating step is carried out using multiphoton excitation of fluorescence emission.
24. *(Previously added)* The process, as claimed in claim 6, wherein said irradiating step is carried out using two photon excitation.
25. *(Previously added)* The process, as claimed in claim 6, wherein said irradiating step is carried out using a cw laser, modulated by means of an acousto-optical modulator.
26. *(Previously added)* The process, as claimed in claim 6, wherein said irradiating step is carried out using a cw laser, modulated by means of a Pockel cell.
27. *(Previously added)* The process, as claimed in claim 6, wherein said irradiating step is carried out using a pulse laser, which is additionally modulated.

28. *(Previously added)* The process, as claimed in claim 6, wherein said irradiating step is carried out using a pulse laser, which is additionally modulated by means of an acousto-optical modulator.

29. *(Previously added)* The process, as claimed in claim 6, wherein said irradiating step is carried out using a pulse laser, which is additionally modulated by means of a Pockel cell.

30. *(Previously added)* The process, as claimed in claim 15, wherein in said irradiating step, the multiphoton process is second harmonic generation on surfaces.

31. *(Previously added)* The process, as claimed in claim 15, wherein in said irradiating step, the multiphoton process is two photon excitation.

32. *(Previously added)* The process, as claimed in claim 6, wherein said detecting step is carried out using time resolution and wherein said irradiating step is carried out using a multiphoton process.

33. *(Previously added)* The process, as claimed in claim 32, wherein in said irradiating step, the multiphoton process is second harmonic generation on surfaces.

34. *(Previously added)* The process, as claimed in claim 32, wherein in said irradiating step, the multiphoton process is two photon excitation.

35. *(Previously added)* The process, as claimed in claim 6, wherein said irradiating step is carried out using a pulsed near infrared laser.

36. *(Previously added)* The process, as claimed in claim 6, wherein said irradiating step is carried out using a pulsed near infrared laser, and further comprising the step of:

converting the frequency of the laser downstream to 1 photon excitation.

37. *(Previously added)* The process, as claimed in claim 6, wherein said irradiating step is carried out using a pulsed near infrared laser, and further comprising the step of:

converting the frequency of the laser downstream to 1 photon excitation of fluorescence.

38. *(Previously added)* The process, as claimed in claim 6, wherein said detecting step is carried out using phase sensitive detection for improving the signal to noise ratio.